Overview of Cisco 700 Series Routers

Cisco 700 series routers connect Ethernet LANs to other networks over Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) lines. Cisco 700 series routers offer multiprotocol routing capability between WAN and LAN ports and can function as transparent bridges.

This chapter contains the following sections:

- Product Features
- Security Features
- SNMP Support
- Supported MIBs
- Supported RFCs
- Router Panels
- Specifications

For more information on the commands described in this chapter, refer to the *Cisco 700 Series Command Reference*.

Product Features

This section describes the major features of Cisco 700 series routers.

Dial-On-Demand Routing

Cisco 700 series routers include dial-on-demand routing (DDR). This allows the router to dynamically initiate calls to remote devices across ISDN BRI lines as traffic demands. The router also terminates ISDN connections based on the level of the traffic demanded on the ISDN line and the dynamic routing parameters.

SPID and Switch Automatic Detection

The automatic service profile identifier (SPID) and switch detection feature simplifies the use of ISDN terminal equipment and makes the equipment easier to use with fewer parameters to enter. With this feature, the user only has to enter the local directory numbers with area code. No SPID number or switch type is required from the user. The command used is the **set autodetection** command.

The automatic detection feature only applies to ISDN switches for the USA and Canada, usually an AT&T 5ESS Custom, DMS-100, NI-1, or NI-2 switch. The automatic detection mechanism might not work with any other switch, such as a Siemens switch. The automatic detection feature is only implemented in the U. S. image.

TFTP Client

Cisco 700 series routers support the use of a Trivial File Transfer Protocol (TFTP) client. This feature increases TFTP file transfer efficiency and reliability. The **swl tftp** command loads the TFTP client software from the console port.

Profile-Based User Name and Password

Remote users often have multiple service providers. Connecting to different service providers might require different user names and passwords. Previous releases of Cisco 700 software used the same user name and password for all profiles when making outgoing Point-to-Point Protocol (PPP) connections. Cisco 700 series router software Release 4.1(1) allows different profiles to have different user names and passwords.

In previous releases, the **set systemname** command set the system prompt and the PPP user name when making outgoing PPP connections. Different profiles can now use different user names when dialing out. A new profile level command, the **set ppp clientname** command, has been created for this purpose.

Bandwidth Allocation Control Protocol and Bandwidth Allocation Protocol

The Bandwidth Allocation Control Protocol (BACP) and the Bandwidth Allocation Protocol (BAP) define a set of rules to control dynamic bandwidth allocation gracefully by managing the number of links in a PPP multilink bundle. BACP consists of a network control protocol that negotiates once per PPP multilink bundle while BAP defines a set of request and response messages to manage the links.

Cisco 700 series router software Release 4.0(2) already supports dynamic management of both B channels with the demand feature. The implementation of BACP and BAP allows Cisco 700 series routers to coordinate and negotiate the actual allocation and deallocation of the second channel. The parameters are set using the **demand** command and the **timeout** command.

BACP is only implemented on a BRI interface. A Multilink PPP has to be negotiated for BACP to be functional.

If a data call is bumped to accommodate a voice call and if BAP negotiation is enforced, the user might experience a short audio idle period before a B channel becomes available. The user might not be able to connect the voice call if the peer declines to give up the link. This happens when the **set ppp bacp linkdrop negotiation** command is set to ON.

NetBIOS Over TCP/IP Packet Filter

A generic filter capability on the Transaction Control Protocol/User Datagram Protocol (TCP/UDP) packets allows users to filter NetBIOS packets generated by application programs. Use the **set ip filter** command to control this feature.

NetBIOS Name Spoofing

When a WINS client sends out a NetBIOS Name query, the router can answer a NetBIOS name query in place of the WINS server. If the router cannot answer, the router forwards the query packets to the server, which forwards the response to the client. If spoofing is set, the router keeps a local database of up to 100 Domain Name System (DNS) name entries and has an aging scheme to age out the unused name entries.

Automatic Configuration From BOOTP

The automatic configuration feature allows the Cisco 700 series router to obtain a configuration file from a remote server using BOOTP protocol. Upon power-up, the router examines the Auto_Config flag stored in NVRAM. If the Auto_Config flag is FALSE, the router initiates a BOOTP request for an IP address from the BOOTP server. If the BOOTP server finds a matching MAC address, the server returns an IP address and a configuration file name. The router initiates TFTP to download a configuration file.

After successfully loading the configuration file, the router sets the Auto_Config flag to TRUE in NVRAM. In subsequence power-up operations, if the Auto_Config is TRUE, the router does not initiate BOOTP. The **set default** command resets the Auto_Config flag to FALSE.

The automatic configuration feature only works on the Ethernet interface. If the router does not receive a BOOTP response from the server within 5 seconds of the first BOOTP request, the router gives up and the Internet Protocol (IP) information must be configured manually.

DHCP Server

DHCP automates IP addressing and reduces the number of IP addresses a site might require. Cisco 700 series routers can function as a dynamic host configuration protocol (DHCP) server. (The router can also act as a DHCP relay, but not both at the same time.)

When a DHCP server is enabled and configured, it assigns and manages IP addresses from a specified address pool to DHCP clients. The options supported by this server are sufficient for Windows 95 clients. If more IP addresses or options are required, a commercial DHCP server (for example, Windows NT) should be used.

DHCP Relay Agent

Cisco 700 series routers can function as a DHCP relay agent. (The router can also act as a DHCP server, but not both at the same time.) When configured, Cisco 700 series routers relay DHCP requests and responses between DHCP clients and a specified DHCP server. Use the **set dhcp relay** command, where the IP address is the address of the server to which DHCP requests will be forwarded.

Port Address Translation

Cisco 700 series routers support port address translation (PAT) allowing a designated private IP network to communicate with the outside world. When configured, Cisco 700 series routers translate source addresses from an IP private network to a single, global, unique IP address before forwarding the packets to the outside world.

IP Address Assignment Through IPCP

The router can be assigned an IP address from the remote device using Internet Protocol Control Protocol (IPCP) address negotiation. The implementation is based on RFC1332. It supports IPCP options 1 and 3. (It does not support option 2, TCP/IP Header Compression.) IP unnumbered is also supported. IPCP address negotiation is on by default in any profile configured for IP routing. This feature does not support assigning addresses to remote devices.

IP RIP Update Linkup

The IP Routing Information Protocol (RIP) Update Linkup option for IP RIP enables better interoperability between the router and Cisco IOS software. If the IP RIP update is set to link up for a WAN profile, the IP RIP data is sent as soon as a connection is established and

again every 30 seconds for as long as the connection exists. If the connection does not exist, no RIP data is sent. This prevents the line from being brought up by RIP packets where the update is periodic.

Force Dynamically Negotiated IP Addresses

When this feature is on, the negotiated IP address is assigned to the Standard or the user-defined profile (whichever profile is used to place the call). It also tells the software to try any IP address configured for this profile in the IP address negotiation.

When this feature is off and the internal profile does not contain an address, the negotiated IP address is automatically assigned to the Internal profile by the system. If the Internal profile contains an address, it will be assigned to the user-defined profile from which the call was initiated. The parameters are set using the **set ppp address negotiation** command.

Fee Pulse Mode

Fee Pulse Mode manages the ISDN connection based on the paid periods of time. If other thresholds indicate a call should be dropped due to low traffic, Fee Pulse Mode maintains the connection until the current paid period has expired. Therefore, you are not paying full price for part of a connection period. This feature is available only for NET3 (same as ETSI) switch types, and you must subscribe to Advice of Charge-During Active Call (AOC-D) supplementary service.

If the feature is enabled and idle time expires, the router checks the remaining time in the current paid period. The router maintains the connection until the end of the paid period, minus the disconnect time required to terminate the PPP and ISDN links.

If the idle time expires too close to the end of the paid period to close the connections before the end of the paid period, the router extends the connection to the end of the next paid period, minus disconnect time.

Call Transfer

Cisco 700 series routers can transfer an active voice call to another telephone number. For more information on configuring call transfer, refer to the chapter "ISDN and Analog Telephone Devices."

Call Forwarding (Sweden and Finland)

Call forwarding supplementary service has been added for Sweden and Finland (NET3). Call forwarding is implemented differently in the European countries. The version implemented here uses keypad procedures and is only partly ETSI-compliant.

Three-Way Call Conferencing

Cisco 700 series routers can add another party to an active voice call. You can connect three people using this feature. For more information on configuring three-way call conferencing, refer to the chapter "ISDN and Analog Telephone Devices."

Data Call Button (Cisco 770 Series Router Only)

The data call button, located on the front panel of Cisco 770 series routers, provides an alternative to establishing or disconnecting data calls through the command interface. The data call button performs in Make or Break mode. If no B channels are connected for data, and at least one B channel is available, the button works in Make mode and attempts to establish a call. When at least one B channel is connected for data, the button works in Break mode, disconnecting the call. Table 1-1 summarizes the operation of the Cisco 770 series data call button.

Table 1-1   Cisco 770 Series Data Call Button Operation Summary

Current Status	No call up	1 data call only	2 data calls	1 voice call only	2 voice calls	1 data and 1 voice call
Switch Operation	Make a data call	Disconnect the data call	Disconnect both data calls	Make a data call	No action	Disconnect the data call

Second Number Fail-Over

Cisco 700 series routers can place a call to a backup telephone number when an outgoing call is not successful because the receiving side is busy or does not answer. Cisco 700 series routers support second number fail-over for manual and auto-data calls. The parameters are set using the **set backupnumber** command.

IPX Support

To improve performance, only the services defined in Novell IPX Router Specification 107–000029–001 are supported, and a maximum of 400 IPX route entries and 200 IPX SAPs are allowed. If you need more route and SAPs entries, software Release 4.0(1) and higher supports **set ipx sap helper** and **set ipx gateway** commands.

IPX Ping

The IPX ping feature allows you to determine if the specified IPX node is alive and reachable. Cisco 700 series routers only generate Novell IPX format ping packets when IPX ping is sourced from the router. The response by the Cisco 700 series router to a Novell IPX ping packet is in Novell IPX format. The response by the Cisco 700 series router to Cisco IPX ping packets is in Cisco IPX format. (If a Novell NetWare server is pinged, the specified server must be running the IPXPING.NLM to respond to the ping. This NLM [NetWare Loadable Module] is part of an IPX Upgrade [IPXRTR.EXE] to NetWare servers.) The parameters are set using the **ipxping address** command.

Default IPX Route

Cisco 700 series routers can route IPX packets to an established default gateway if no learned or static route can be found for the destination in the routing table. The parameters are set using the **set ipx gateway** command.

IPX SAP Filtering

IPX SAP filtering controls which services are added to the Cisco 700 series router Service Advertisement Protocol (SAP) table. You can specify filters per type range or socket range. Before a service is added to the SAP table, the service type and socket number for the service is checked against the existing filters. If the type and socket ranges match any of the existing filters, service is permitted or denied based on the action specified in the action field of the filter. Otherwise (no filter matches the incoming service), the service is blocked. If no filter is configured, all SAPs are permitted. The parameters are set using the **set ipx filter sap** command. The maximum number of SAP filters is 20.

Service Advertising Protocol (SAP) Helper

Cisco 700 series routers can forward to a specified router or server (instead of responding to them) all SAP get-nearest-service request broadcast packets and get general service request broadcast packets to an IPX router or IPX server as unicast packets. Cisco 700 series routers forward these request packets without looking in the local SAP table. The parameters are set using the **set ipx sap helper** command.

Route Summarization

Route summarization is provided on IP RIP Version 2 (only Version 2 provides the required subnet mask information). When route summarization is set to auto, the router summarizes routes that cross the classful boundary to a single route based on the classful boundary. When route summarization is set to off, the router uses the normal RIP Version 2 routes with variable-length subnet masks (VLSMs). The default setting for RIP summarization is OFF. Use the **set ip rip summarization** command to control this feature.

Data Compression

Cisco 700 series routers support data compression using the compression algorithm QIC-122 standard, Stacker LZS. Data compression is a software configuration option that optimizes the ISDN line bandwidth. Packets are compressed before being sent onto the ISDN line. After they arrive at their destination, the packets are decompressed and sent on to the remote LAN.

Security Features

Cisco 700 series routers provide the following security features:

- PPP authentication support, including Password Authentication Protocol (PAP) and Challenge Handshake Authentication Protocol (CHAP)

- Password security for local and remote configuration access

- IP filtering based on source and destination addresses, source and destination ports, and packet types

Leased Line Authentication Requirement Removed

For 64-kbps or 128-kbps leased line connections, previous versions of the software required PAP/CHAP authentication to identify the corresponding profile. In software Release 4.0(1) and higher, the authentication sequence is no longer required for leased line connections.

To eliminate the need for authentication, a user-defined profile named *leasedline* must be present and defined. If this profile is not present upon call connect, the router requires authentication to select the correct profile. If the call cannot be authenticated, the router defaults to the Standard profile.

Within the user-defined profile called *leasedline*, verify that PPP authentication is set to none. The switch types that support this feature are PERM64 and PERM128.

SNMP Support

Cisco 700 series routers support Simple Network Management Protocol (SNMP).

SNMP Community Names

Cisco 700 series routers support the following SNMP community names:

- public
- proxy
- private
- regional
- core

These community names are read-only and cannot be changed. Cisco 700 series routers do not support SNMP **set** commands.

Supported MIBs

Cisco 700 series routers support the following SNMP Management Information Bases (MIBs):

- MIB II
- IEEE 802.1d Bridge MIB

MIB II

Cisco 700 series routers support MIB II standards as follows:

- System
- Interfaces (all objects, except that a connection is considered to be an interface)
- Address translation
- Internet Protocol (IP)
- Transmission Control Protocol (TCP)
- Internet Control Message Protocol (ICMP)
- User Datagram Protocol (UDP)
- SNMP

IEEE 802.1d Bridge MIB

Cisco 700 series routers support IEEE 802.1d MIB standards as follows:

- Base
- Transparent bridging
- Static

Supported RFCs

Cisco 700 series routers support the following Request For Comments (RFC) documents:

- RFC 1058—Routing Information Protocol (RIP)
- RFC 1332—PPP Internet Protocol Control Protocol (IPCP)
- RFC 1334—PPP Authentication Protocols
- RFC 1541—Dynamic Host Configuration Protocol (DHCP)
- RFC 1552—PPP Internetwork Packet Exchange
- RFC 1570—PPP Link Control Protocol (LCP) Extensions
- RFC 1582—Extensions to RIP to Support Demand Circuits
- RFC 1618—PPP Over ISDN
- RFC 1638—PPP Bridging Control Protocol (BCP)
- RFC 1661—Point-to-Point Protocol (PPP)
- RFC 1717—PPP Multilink Protocol (MP)
- RFC 1723—Routing Information Protocol (RIP) Version 2—Carrying Additional Information

Router Panels

Figure 1-1 and Figure 1-2 show the front panels of Cisco 760 series and Cisco 770 series routers. Instructions for connecting the routers are provided in the *Cisco 700 Quick Reference Guide*.

Figure 1-1   Front Panel, Cisco 760 Series Router (Cisco 766 Shown)
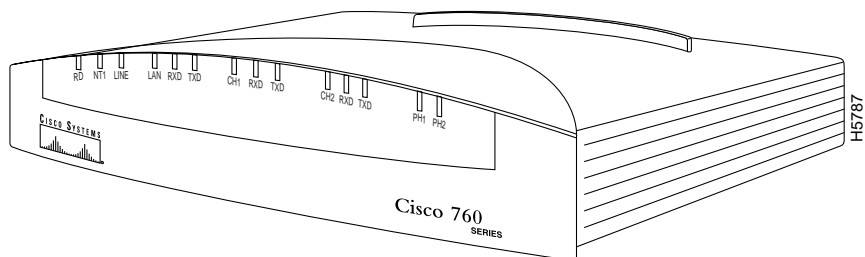
Figure 1-2   Front Panel, Cisco 770 Series Router (Cisco 776 Shown)
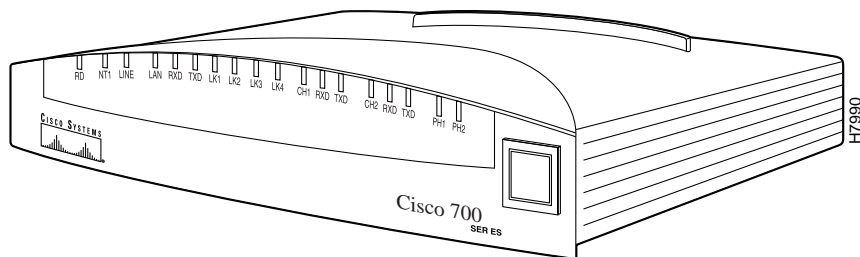
The ports for the Ethernet, ISDN S/T, ISDN U, and basic telephone service connections are located on the rear panel of the Cisco 760 series router, as shown in Figure 1-3 through Figure 1-6 and on the rear panel of the Cisco 770 series routers, as shown in Figure 1-7 through Figure 1-10.

Figure 1-3   Rear Panel, Cisco 761 Router
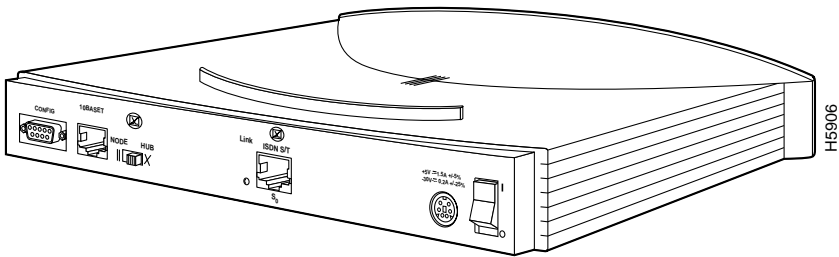
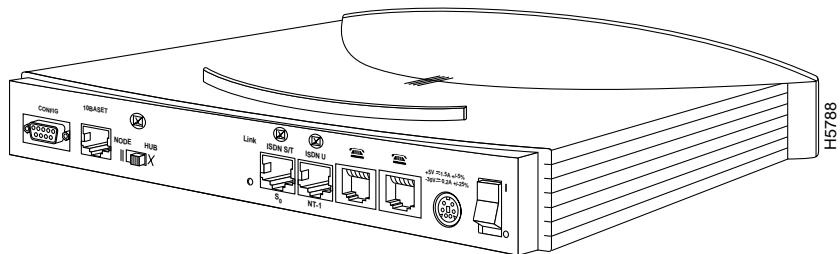**Figure 1-4   Rear Panel, Cisco 762 Router**
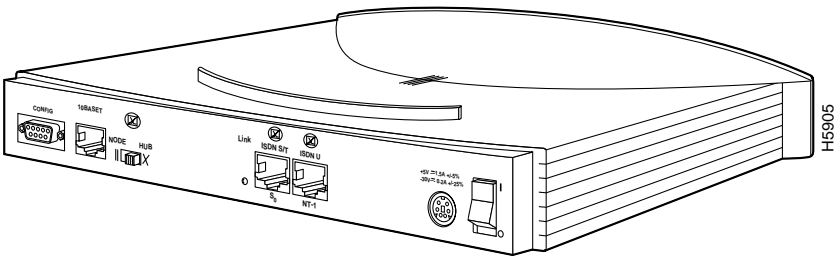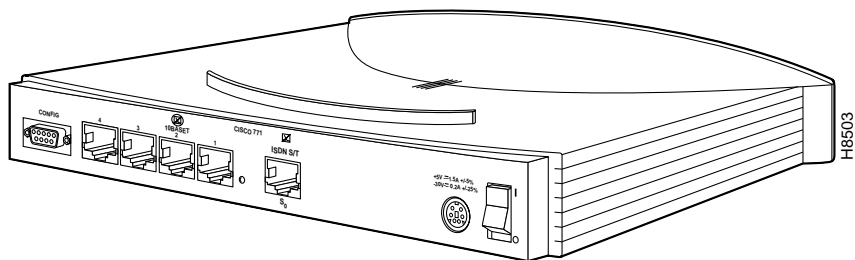

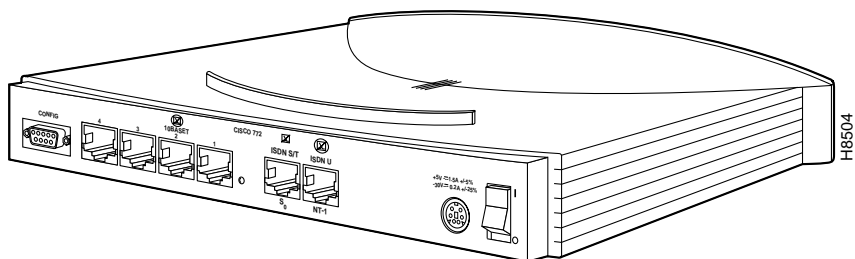**Figure 1-5   Rear Panel, Cisco 765 Router**
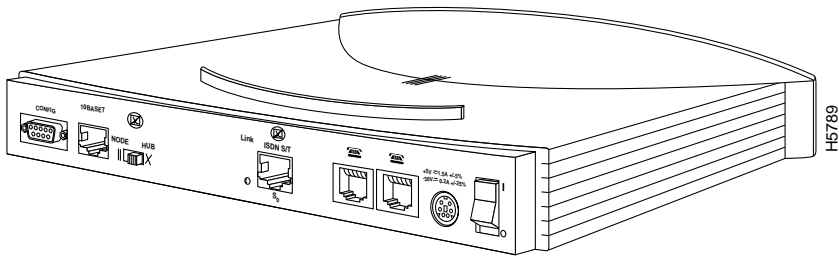
Figure 1-6   Rear Panel, Cisco 766 Router

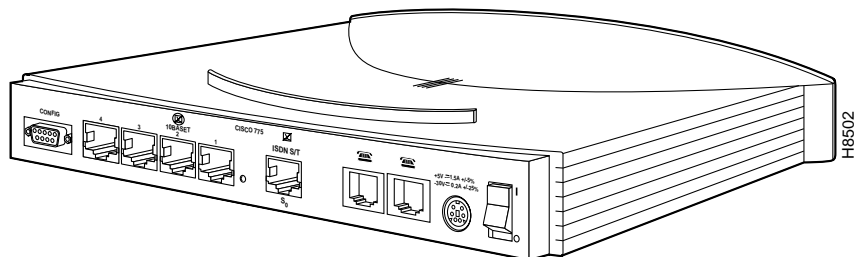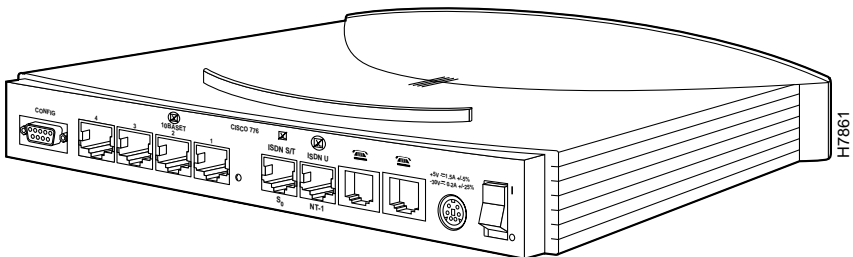**Figure 1-7   Rear Panel, Cisco 771 Router**

Figure 1-8   Rear Panel, Cisco 772 Router

Figure 1-9   Rear Panel, Cisco 775 Router

Figure 1-10   Rear Panel, Cisco 776 Router

Specifications

The specifications for Cisco 700 series routers are listed in Table 1-2.

Table 1-2   System Specifications—Cisco 700 Series Routers

Description	Design Specification
(Height x Width x Depth)	1.6 x 8.3 x 9.6 inches (4.1 x 21.1 x 24.4 cm)
Weight	Cisco 761 and Cisco 771: 1.4 lb. (0.6 kg) Cisco 762 and Cisco 772: 1.5 lb. (0.7 kg) Cisco 765 and Cisco 775: 1.6 lb. (0.7 kg) Cisco 766 and Cisco 776: 1.7 lb. (0.8 kg)
Power supply	External
Voltage	100 or 250 VAC
Frequency	50 to 60 Hz
Processor	25-MHz 80386
Memory	1.5 MB of primary memory 496 KB of Flash memory 16 KB of NVRAM
Ethernet interfaces	Ethernet 10BaseT, RJ-45
ISDN BRI interfaces	ISDN S/T, RJ-45 ISDN U, RJ-45
Analog telephone interface	RJ-11
Configuration port	DB-9F (9-pin female)
Operating temperature	32 to 120°F (0 to 50°C)
Storage temperature	−30 to 160°F (−35 to 70°C)
Operating humidity	20 to 95%, noncondensing
Regulatory compliance	FCC Class B requirements and other compliance as outlined in the *Regulatory Compliance and Safety Information for Cisco 700 Series Routers* document shipped with your router

Table 1-3 lists the interfaces available on each Cisco 700 series router by model number.

Table 1-3   Cisco 700 Series Router Interfaces by Model

Model	Interfaces
Cisco 761	1 Ethernet and 1 ISDN BRI S/T
Cisco 762	1 Ethernet, 1 ISDN BRI S/T, and 1 ISDN BRI U
Cisco 765	1 Ethernet, 1 ISDN BRI S/T, and 2 analog telephone
Cisco 766	1 Ethernet, 1 ISDN BRI S/T, 1 ISDN BRI U, and 2 analog telephone
Cisco 771	4 port unmanaged Ethernet hub and 1 ISDN BRI S/T
Cisco 772	4 port unmanaged Ethernet hub, 1 ISDN BRI S/T, and 1 ISDN BRI U
Cisco 775	4 port unmanaged Ethernet hub, 1 ISDN BRI S/T, and 2 analog telephone
Cisco 776	4 port unmanaged Ethernet hub, 1 ISDN BRI S/T, 1 ISDN BRI U, and 2 analog telephone